REPORT

ON THE

EXPERIMENTAL FARMS

IN THE

CENTRAL PROVINCES

FOR

THE YEAR 1903-04.

Ending 31st March 1904.

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FROM

B. P. STANDEN, ESQ., I. C. S., C. I. E.,

COMMISSIONER OF SETTLEMENTS AND AGRICULTURE,

Central Provinces,

TO

THE CHIEF SECRETARY TO THE HON'BLE THE CHIEF COMMISSIONER, CENTRAL PROVINCES,

REVENUE DEPARTMENT.

Nagpur, the 17th September 1904.

SIR,

I have the honour to forward the report on the Experimental Farms at Nagpur and Telinkheri for the year 1903-04, together with brief memoranda regarding the farms at Pawarkheda near Hoshangabad and Labandih near Raipur, which were established for experimental purposes during the year. I regret that the report is submitted late.

Forms and contents of Report.

2. The form of the Nagpur Farm Report is somewhat different from that usually adopted. A programme of the work of the Agricultural Department, Central Provinces, is now published annually, and some of the matter which has been shown formerly in the Annual Farm Report might more fittingly find a place in the programme, and has been relegated this year to that publication. It has lately been suggested in a note received from the Government of India that it might be better to omit detailed discussions on the results of the experimental cultivation from the report, and to publish bulletins from time to time when definite results have been obtained. The report now forwarded had already been written when this note was received. Moreover, before making this alteration, I should like an opportunity of consulting the Inspector-General of Agriculture on the subject. I have therefore retained the detailed notes on experiments. Before the report for the current year is due, the matter will have been settled.

Character of season.

3. The monsoon was unfavourable for rain crops. Germination was good, but excessive rain in the latter half of July and throughout August prevented timely weeding and seriously affected all crops except juar grown on the land manured on the Meagher system. Maize was completely destroyed. In October there was good sowing rain for rabi crops; and in spite of the absence of winter showers, all crops yielded well, particularly linseed and peas.

Improvements.

4. During the year the Public Works Department undertook the improvement and extension of the irrigation work which provides the Farm and the Maharajbagh and Telinkheri Gardens with water from Telinkheri Tank. The work has not yet been satisfactorily completed.

Abstract of work carried on at Nagpur Farm.

5. The work performed on the Farm may be considered under several heads:—

(*a*) *Experimental cultivation to determine the comparative merits of different methods of cultivation.*—In 1902-03, under the advice of the Inspector-General of Agriculture, the scheme of experiments was subjected to extensive alterations; consequently out of the 9 series only 2 for testing the effect of different manures on wheat are likely to afford conclusive results in the near future. The interesting remarks of the Superintendent on these two series indicate that material for the issue of a bulletin on part of this subject at least will soon be available.

(*b*) *Cultivation of different varieties of crops with the view of discovering good varieties well suited to this part of the provinces.*—Out of a large number of varieties cultivated, only three kinds of early rice from the Punjab and one variety of bajra from Allahabad were considered worth cultivating on an extended scale in the current year.

(*c*) *Cultivation of selected varieties for seed distribution.*—Seed of 5 varieties of cotton, 4 of juar, 2 of rice, 4 of wheat, and 16 of other crops was distributed, most of it through the District Agricultural and Industrial Associations. The acclimatized Upland Georgian cotton seed was distributed for the first time. Part of it was given out through the Manager of the Empress Mills, and arrangements are being made to ensure that the cultivators shall receive the full value of the produce.

(*d*) *Production of new varieties of cotton and wheat obtained by cross-fertilization.*—The experiments in this direction which were commenced in the preceding year have been continued. The object is to produce a cotton combining the productive powers and hardiness of the local varieties with the higher class lint of exotic kinds, and to produce a rust-resistant wheat of good milling quality, 21 crosses of cotton were made and cultivated, and the Manager of the Empress Mills kindly examined and reported upon the lint of 17 of these. The results are decidedly encouraging. 23 crosses of wheat were made, but no definite results were obtained as the year was not favourable to rust.

(*e*) *Investigation of plant diseases.*—Experiments were continued with the view of determining the degree of strength to which sulphate of copper solution can be safely used for preventing smut in juar, and endeavours were made in collaboration with Dr. Butler (Cryptogamic Botanist to Government of India) and Dr. Leather (Agricultural Chemist to Government of India) to discover a remedy for the fungoid disease which frequently ruins the tur crop in these provinces.

(*f*) *Trial of implements.*—Several new implements were tried during the year with good results, and one of these, a cheap fodder-cutter, may find a market amongst cultivators in the Nagpur country and Berar.

(*g*) *Work in combination with the Demonstration Branch of the Agricultural Department.*—The Demonstration Branch made use of the results worked out on the Farm in the following directions:—

Introduction of new or improved varieties of crops.

Introduction of fodder-cutters and winnowing machines.

Prevention of smut in juar.

I shall deal with this subject in greater detail in the report on the Department of Agriculture.

Telinkheri Farm.

6. The Telinkheri Farm is worked as a supplement to the Nagpur Farm, and is chiefly used for the purpose of producing seed of approved new or improved varieties for distribution to cultivators.

Pawarkheda and Labandih Farms.

7. The new experimental farms at Pawarkheda near Hoshangabad and Labandih near Raipur were purchased during the year under report: but there was not time to get them into proper order before the sowing season. The work performed on these farms during the year was therefore confined to the clearing and preparation of the land for experimental purposes. A considerable area was put under crop with the object of improving the condition of the land. A programme of experiments was drawn up with the assistance of the Inspector-General of Agriculture and experimental work has begun in the current year on both farms. Rabi is the main subject at Pawarkheda, cotton and juar at Nagpur, and rice at Labandih.

Cattle-breeding Farms.

8. A breeding establishment for Malwa cattle was established at Pawarkheda during the year. The Assistant Director of Agriculture visited the home of this breed in the neighbourhood of Tarana on the Bhopal-Ujjain Railway and bought 26 cows, 6 calves and 1 bull. There were 8 births during the year. Mr. Joshi experienced great difficulty in finding a well-grown bull true to type and the bull purchased is not quite perfect. The grazing ground of the herd has been completely fenced. Next year it will be necessary to sub-divide it into three portions with the object of separating the young bulls and heifers from the rest of the herd. The Telinkheri herd of Gaolao cattle increased during the year to 38 cows, 21 bull calves and 16 cow calves. During the year a separate grazing ground was fenced off for the young bulls and 19 were transferred to it. It still remains to provide separate grazing for the heifers to avoid risk of premature covering by the bull. One bull-calf, which does not promise to be fit for the stud, was castrated.

9. Mr. Bhayalal Dube continues to manage the Nagpur Farm satisfactorily. He held charge of the Maharajbagh and Telinkheri Gardens also for some months. Messrs. Jiyalal and Tundilal Powar, Superintendents of the Pawarkheda and Labandih Farms, have made a satisfactory beginning.

10. Mr. Joshi, Assistant Director of Agriculture, worked with undiminished zeal and the services he has rendered to agriculture were recognized by the grant of the title of Rai Bahadur.

I have the honour to be,

Sir,

Your most obedient Servant,

B. P. STANDEN,

Commissioner of Settlements and Agriculture.

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No. 250.

FROM

MR. BHAYALAL DUBEY, L. AG.,

SUPERINTENDENT, GOVT. EXPERIMENTAL FARM,

Nagpur,

TO

THE COMMISSIONER OF SETTLEMENTS AND AGRICULTURE,

Central Provinces.

SUBJECT:
Report on the Nagpur and Telinkheri Experimental Farms for the year 1903-04.

Nagpur, the 6th August 1904.

SIR,

I have the honour to submit the Annual Report for the year ending 31st March 1904 on the working of the Experimental Farms at Nagpur and Telinkheri.

I.—CHARACTER OF THE SEASON.

2. The following table compares the rainfall of the year as registered on the farm with the average of the preceding 29 years :—

Month.	Number of rainy days.	Rainfall.	Average of 29 years preceding.	Month.	Number of rainy days.	Rainfall.	Average of 29 years preceding.
		Inches.	Inches.			Inches.	Inches.
April ... 1st half ...	...	·06	·18	October. 1st half ...	3	1·90	1·16
April ... 2nd half ...	...	...	·28	October. 2nd half...	1	·17	1·21
May ... 1st half ...	1	·37	·21	November. 1st half ...	...	...	·60
May ... 2nd half...	4	2·08	·25	November. 2nd half...	...	...	·16
June ... 1st half ...	3	1·11	2·63	December. 1st half ...	...	...	·15
June ... 2nd half...	10	5·62	4·91	December. 2nd half...	...	...	·25
July ... 1st half ...	6	7·25	6·66	January. 1st half ...	...	...	·34
July ... 2nd half ...	10	17·52	7·33	January. 2nd half...	...	...	·19
August. 1st half ...	7	4·33	6·65	February 1st half ...	...	...	·19
August. 2nd half...	11	9·01	5·19	February 2nd half...	...	...	·25
September. 1st half ...	4	2·69	4·45	March ... 1st half ...	1	·50	·21
September. 2nd half ...	5	2·57	3·98	March ... 2nd half...	3	·37	·19
				Total ...	69	55·55	47·62

NOTE.—A rainy day is taken as one on which there was a fall of not less than 10 cents.

3. The regular monsoons broke in the middle of June and the sowings of kharif crops were finished in due time. The germination of all the crops was good. The rainy season was exceptionally wet throughout till the end of August, and consequently, owing to the water-logged condition of the soil, no kharif crops could be satisfactorily hand-weeded or bullock-hoed. Excepting the juar grown on fields manured with night-soil after the Meagher system, all other kharif crops suffered very much from Excessive moisture. The cotton plants could not make any progress before September, and after that they did not get sufficient time to do so, as the flowering had already set in, and thus the plants remained stunted in growth, finally giving much less outturn than what was obtained last year. Tur after September grew vigorously and in the end produced good outturn. Owing to incessant rain juar grown on the unmanured fields turned yellow, but soon after the break it improved considerably and yielded fairly. Owing to the constantly water-logged condition of the soil maize was a complete failure. The total rainfall of the year amounted to 55·55 inches as against 29·88 inches of the last year and an average of 47·62 inches.

4. The rainfall of about 2 inches in the month of October was very favourable for preparing the rabi seed bed. The crops were sown in due time and good germination was secured. Linseed flourished from the beginning to the end. Peas gave a bumper yield. And wheat, notwithstanding the total absence of winter rains, gave an outturn of 750 lbs. per acre.

II.—RESULTS OF THE SEVERAL SERIES OF EXPERIMENTS IN DETAIL WITH COMMENTARY.

SERIES A. SUBJECT.—*Continuous manure experiments with irrigated wheat.*

Plot I.—Area ·10 acre. Manured with saltpetre (40 lbs. nitrogen per acre).
" II.— " ·10 " " bone-dust (40 lbs. nitrogen per acre).
" III.— " ·10 " " saltpetre and bone-dust (saltpetre 25 lbs. nitrogen per acre and bone-dust 15 lbs. nitrogen per acre).
" IV.— " ·10 " " cattle-dung (40 lbs. nitrogen per acre).
" V.— " ·10 " " cattle-dung and bone-dust (cattle-dung 25 lbs. nitrogen per acre and bonedust 15 lbs. nitrogen per acre).
" VI.— " ·10 " " ashes of cattle-dung (40 lbs. nitrogen per acre).
" VII.— " ·10 " Unmanured.
" VIII.— " ·10 " Green manured with *san* (seeds 100 lbs per acre).
" IX.— " ·10 " Green manured with *kadoojira*.
" X.— " ·10 " Manured with saltpetre (20 lbs. nitrogen per acre).
" XI.— " ·10 " " " (20 lbs. nitrogen per acre top-dressed).
" XII.— " ·10 " " farm-yard manure (40 lbs. nitrogen per acre).

Crop—wheat (*haura*)—Nagpur. Irrigated once from 19th to 26th December 1903.

No. of plot.	OUTTURN PER ACRE.									
	AVERAGE OF 5 YEARS 1890-91 TO 1894-95.		AVERAGE OF PRECEDING 6 YEARS EXCLUDING 1899-1900.		1902-03.		1903-04.			
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Value.	Gain in value on plot No. VII.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs.	Rs.
I ...	931	1,789	801	999	1,647	2,842	1,123	1,216	38	19
II ...	626	954	510	685	1,327	1,702	925	975	31	12
III ...	1,012	1,924	757	1,016	1,476	1,673	975	1,045	33	14
IV ...	717	1,217	941	1.185	1,435	1,595	1,661	1,338	55	36
V ...	739	1,343	834	1,255	1,505	1,975	922	847	31	12
VI ...	584	915	583	688	1,090	1,290	757	713	25	6
VII ...	486	820	353	467	882	1,167	561	599	19	...
VIII ...	564	1,090	569	796	1,260	1,500	832	627	27	8
IX ...	...	...	...	...	1,175	1,345	835	665	27	8
X ...	...	...	...	...	1,300	1,960	1,107	1,055	37	18
XI ...	...	...	...	...	967	1,342	835	865	28	9
XII ...	...	...	...	...	1,117	1,392	735	845	25	10

5. Wheat was sown on the 27th October and harvested on the 19th February. The series was irrigated only once, *viz.*, on the 19th December. It could not be irrigated second time because the channel which carried water to all the different plots was dug up to lay out the distributary pipes. The last four plots have been added to the series since 1902-03, so that there are no averages for the preceding years. The outturn figures of the year under report are much less than those of last year.

6. The plot I manured with saltpetre is second in the list with an outturn nearly double that of the unmanured plot, which was also the case last year. The outturn of this plot last year was the highest, but that was due only to an exceptionally good season in which the plants could utilize fully the manurial ingredients of saltpetre at a time when they could be most benefited by it. The averages of preceding years of this plot show, however, that the outturn is diminishing annually, and that excepting in the first few years its outturn is less than that of the plot manured with cattle-dung, as is the case in the year under report. The saltpetre contains only nitrogen and potash, and in the beginning it exercised its well-known effect on the soil which was already stocked with other elements of nutrition. But the soil can bear this drain of other nutrients only up to a certain point, and hence the application of saltpetre does not show such effective outturns in ordinary seasons as it did in the previous years, because the stores of the soil other than the nitrogen and potash found in saltpetre are insufficient to supply the plant with enough food.

7. The plot manured with bone-dust has given fairly good results this year as it did last year also. But if the averages of previous years be considered it will be found that the bone-dust was of indifferent manurial value; this stuff in conjunction with either saltpetre or cattle-dung has been giving throughout better results than when applied alone. This seems due rather to the effects of saltpetre and cattle-dung than the bone-dust. The superiority of cattle-dung (a general manure) as shown by the average figures of plot IV + V is fully established. When dung is applied continuously the accumulation of organic matter increases and the acquired fertility also does so. The outturns in the previous years are lower, because the cattle-dung applied in previous years contained most of its nitrogen in the organic form, and this took some time to be converted into nitric acid, which, combined with bases, produces the nitrates, in which form only the nitrogen is taken up by the roots: hence the dung applied in previous years supplies active ingredients afterwards. The farm-yard manure in the 12th plot gives an outturn of 735 lbs. per acre as against 1,117 lbs. of last year, which was only due to the exceptionally good season. But from the above experience we should hope that the produce will gradually increase. This is the second year when this plot was included in the A series.

8. The figures of plot No. VI show that the fertility of the soil cannot be upheld to the desired extent by the addition of mineral matter only; but that there must be some supply of organic matters which generally contain most of the useful ingredients, conserve soil moisture, and also improve the mechanical condition of the soil. The unmanured plot shows the expected results of soil exhaustion which, by comparing the average figures of this plot with those of the similar plot in B, which is unirrigated, is more marked in the former than in the latter. This can only be explained by the extra demand which irrigation brings upon the stores of soil. By continuous irrigation, therefore, satisfactory results can only be attained if manuring is practised side by side.

9. The green-manured plots have given fair results, and we can recommend that in places where cattle-dung is not sufficient to supply the wants of ryots, green-manuring may be substituted for the same.

SERIES B. SUBJECT.—*Continuous manure experiments with dry crop wheat.*

Plot	I.—	Area ·10 acre.	Manured with saltpetre (40 lbs. nitrogen per acre).	
„	II.—	„ ·10 „	„	bone-dust (40 lbs. nitrogen per acre).
„	III.—	„ ·10 „	„	saltpetre and bone-dust (saltpetre 25 lbs. nitrogen per acre and bone-dust 15 lbs. nitrogen per acre).
„	IV—	„ ·10 „	„	cattle-dung (40 lbs. nitrogen per acre).
„	V.—	„ ·10 „	„	cattle-dung and bone dust (cattle-dung 25 lbs. nitrogen per acre and bone-dust 15 lbs. nitrogen per acre).
„	VI.—	„ ·10 „	„	ashes of cattle-dung (40 lbs. nitrogen per acre).
„	VII.—	„ ·10 „	Unmanured.	
„	VIII.—	„ ·10 „	Green manured with *san* (seed 100 lbs per acre).	
„	IX.—	„ ·10 „	Green manured with *kadoojira*.	
„	X.—	„ ·10 „	Manured with saltpetre (20 lbs. nitrogen per acre).	
„	XI.—	„ ·10 „	„	(20 lbs. nitrogen per acre top-dressed).
„	XII.—	„ ·10 „	„	farm-yard manure (40 lbs. nitrogen per acre).

Crop—wheat (*haura*)—Nagpur.

No. of plot.	OUTTURN PER ACRE.											
	Average of 5 years, 1885—89.		Average of 5 years, 1890—94.		Average of 5 years excluding 1899-1900.		1902-03.		1903-04.			
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Value.	Gain on plot No. VII.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs.	Rs.
I	1,133	1,711	751	1,468	475	679	1,031	1,299	637	703	22	7
II	891	1,388	534	882	331	535	922	1,287	629	1,051	23	8
III	1,094	1,751	865	1,538	433	650	1,049	1,291	718	687	24	9
IV	913	1,520	627	1,393	375	641	1,299	1,571	1,045	1,275	36	21
V	955	1,415	666	1,224	567	881	1,301	1,779	880	910	30	15
VI	949	1,598	576	1,125	367	593	1,104	1,316	670	740	23	8
VII	799	1,297	418	796	196	376	726	984	546	684	15	...
VIII	705	1,137	584	1,115	273	489	1,016	1,304	594	808	21	6
IX	...	. .	...	...	...	...	1,252	1,727	732	938	25	10
X . ..	...	...	...	...	...	...	1,262	1,687	740	1,040	26	11
XI	...	...	...	...	...	..	780	1,020	695	685	23	8
XII	...	...	...	...	...	...	919	1,141	699	581	23	4

10. This series is the duplicate of the A series, but the plots are not irrigated. The general remarks on the A series plots apply to this series also. By comparing the outturns of the two series it is easily seen how far irrigation helps to increase the yield, and this is proportionally higher in manured plots than in unmanured ones, which shows that, in order to obtain the best results, along with irrigation manuring also should be practised. The outturns of plot No. I were much greater last year than in the year under report, showing that saltpetre on unirrigated land gives better results when favoured by two or three showers in winter, and poor results when the year is a dry one as the one under report. The most desirable results from saltpetre are, however, obtained only when the crop is irrigated. The outturn of green-manured plots this year is lower than that of last year, for the reason that in the absence of winter rains the decomposition of the crop ploughed in could not be complete enough and thus the plant food from it was not available to plants. In A series sufficient moisture to help this decomposition is secured by irrigation. It is also quite possible that in green-manured plots a slow process of fermentation of the material ploughed in continues in winter, and this process, from the fact of its developing slight heat and thus increasing the temperature of the soil, may be detrimental to the proper growth of the crop. In years of winter rains this extra high temperature is kept down and thus better results are secured. No conclusive results can yet be drawn from the outturns of the last four plots, as they have been recently included in the series, and it is quite possible that their outturns may be influenced by the treatment which they had received in previous years.

SERIES C. SUBJECT.—*Effect of manure on irrigated and unirrigated wheat applied in June and August.*

Plot I.—Area ·10 acre. Manured with cattle-dung (40 lbs. nitrogen per acre) in June.
„ II.— „ ·10 „ Do. do. in August.
„ III.— „ ·10 „ Do. do. in June.
„ IV.— „ ·10 „ Do. do. in August.

Crop—wheat (*haura*)—Nagpur.

No. of plot.	OUTTURN PER ACRE.						Remarks.
	1902-03.		1903-04.				
	Grain.	Straw.	Grain.	Straw.	Value.	Gain in value on plot manured in June.	
	lbs.	lbs.	lbs.	lbs.	Rs.	Rs.	
I ...	1,042	1,617	784	1,016	27	...	Irrigated once on 17th to 18th December 1903.
II ...	1,126	1,584	1,007	1,113	34	+ 10	
III ...	861	1,509	711	669	24	...	Unirrigated.
IV ...	836	1,204	849	1,041	29	+ 2	

11. This series of experiments was initiated in the year 1897-98, in order to see whether manuring of fields in August is more advantageous than in June. According to the new programme of experiments, started since last year at the instance of the Inspector-General of Agriculture, the old site was rejected and the present one selected. The series is duplicated. First two plots receive irrigation and the last two are unirrigated. From this year's experience as well as that obtained in previous years it can be said that manuring in August is distinctly advantageous. The outturns of the III and IV plots do not corroborate what I wrote last year on this subject. The site being a new one some time must elapse to draw any definite conclusion with respect to June and August manuring on unirrigated plots. The results obtained on irrigated plots in both years are consistent. It is worthy of note here that although August manuring for wheat is generally more advantageous, still to put it in practice is difficult owing to the fact that in the month of August, when the fields are often wet and the kutcha roads muddy, the manure cannot be conveniently carted to them.

SERIES J. SUBJECT.—*Effect of manure on juar with subordinate crop tur continuously without rotation.*

Plot I.—Area ·20 acre. Manured with saltpetre (20 lbs. nitrogen per acre) drilled.

„ II.— „ ·20 „ Unmanured.

„ III.— „ ·20 „ Manured with cattle-dung (20 lbs. nitrogen per acre) drilled.

„ IV.— „ ·20 „ Manured with saltpetre (20 lbs. nitrogen per acre) top-dressed.

Crop.—Juar and tur in year under report:—

No. of Plot.	Crop.	OUTTURN PER ACRE. 1903-04. Grain.	Stalks and karbi.	Value.	Gain in value on plot No. II.
		lbs.	lbs.	Rs.	Rs.
I	Juar ...	695	1,847	64	—11
	Tur ...	540	2,063		
II	Juar ...	612	2,621	75	
	Tur ...	530	1,810		
III	Juar ...	640	1,790	61	—14
	Tur ...	537	2,027		
IV	Juar ...	895	1,932	66	— 9
	Tur ...	445	1,787		

12. Here we have a continuous mixed crop of cereal and legume. The discarded results of last year are not included in this year's report. The series was sown on the 30th June. In this series also the juar was not in thriving condition in the beginning. In the first plot saltpetre was sown along with the crop by bamboo tubes behind the sowing implements, while in plot IV the saltpetre was top-dressed on the 14th August when the crops had grown about 10 inches high. The results of these plots, especially with juar, show that top-dressing of saltpetre is more profitable than sowing the same along with the crop. The outturn of tur is just the reverse of above in the two plots. I think this is due more to the fact that the outturns in the two plots have been influenced by treatments in previous years, whose effects have not yet passed away, than to the effects of different methods of saltpetre application. Tur is a papileonaceous plant which can utilize the atmospheric nitrogen. Last year as well in D series it was experienced that top-dressing system of applying saltpetre gave better results. This is most probably due to the fact that before the plants could make use of it, the material, being very soluble, was wasted by surface wash and underground drainage.

13 But if the results of the X and XI plots (which are the plots to compare these two methods of saltpetre application on rabi crops) of the A and B series be compared it will be seen that drilling the saltpetre with seed gives better results. The results of both the years are quite consistent. It would thus seem that top-dressing is more advantageous to the kharif crops and that drilling with seed gives better results in rabi fields.

SERIES D. SUBJECT.—*Effect on cotton and juar-tur (mixed) in rotation of various manures.*

Plot I.—area ·20 Acre. Manured with bone-dust (40 lbs. nitrogen per acre).

„ II.— „ ·20 „ Unmanured.

„ III.— „ ·20 „ Manured with farm-yard manure (40 lbs. nitrogen per acre).

„ IV.— „ ·20 „ Do. do. (20 lbs. do.)

„ V.— „ ·20 „ Manured with poudrette (40 lbs. nitrogen per acre).

„ VI.— „ ·20 „ Manured with saltpetre (do.)

„ VII.— „ ·20 „ Do. (20 lbs. nitrogen per acre used as top-dressing).

„ VIII.— „ ·20 „ Manured with saltpetre and bone-dust (saltpetre 25 lbs. nitrogen per acre and bone-dust 15 lbs. nitrogen per acre).

Manure to be applied in the year in which cotton is grown. Crop—Juar-tur (mixed) in year under report.

No. of Plot.	OUTTURN PER ACRE.						
	1902-03.			1903-04.			
	Crop.	Lint.	Seed.	Crop.	Grain.	Stalks and karbi.	Value.
		lbs.	lbs.		lbs.	lbs.	Rs.
I	Cotton ...	237	407	Juar ...	520	1,890	56
				Tur ...	420	855	
II	Do. ...	235	419	Juar ...	590	2,080	59
				Tur ...	355	755	
III	Do. ...	430	769	Juar ...	955	2,625	79
				Tur ...	440	855	
IV	Do. ...	340	602	Juar ...	870	2,125	68
				Tur ...	415	780	
V	Do. ...	387	687	Juar ...	905	2,130	67
				Tur ...	350	655	
VI	Do. ...	386	650	Juar ...	770	2,075	60
				Tur ...	250	445	
VII	Do. ...	413	757	Juar ...	665	1,765	53
				Tur ...	285	535	
VIII	Do. ...	389	709	Juar ...	720	1,565	52
				Tur ...	325	580	

14. On this series cotton grown on differently manured plots is rotated with juar-tur (6 lines of juar to 2 lines of tur). The series was sown on the 29th June and the germination of both juar and tur was very good. But the young plants, especially juar, could not make any progress on account of continuous rain. Due to this heavy water-logged condition, in the beginning the juar crop looked very pale and afterwards the main shoots were rotten; but, thanks to the small break in August, the plants shed forth side shoots and soon after the crop began to look in nice condition. Finally the outturn of juar on the unmanured plot amounted to 590 lbs. The subordinate crop of tur did not suffer much.

15. The outturn of juar on the bone-dust manured plot is less than on the unmanured one. Tur, however, shows a good return on the same. The manures which were applied last year, and whose effect can be continued to this year's crop, are bone-dust, farm-yard manure and poudrette. The saltpetre being very soluble is liable to surface wash and underground drainage, and therefore it can show its effects only in the year in which it is applied. Manuring with bone-dust has not been a general success on the farm and its effects on juar, from this year's outturn, do not as well seem favourable. The outturn of tur, however, is very satisfactory on this plot, it being next to that of the farm-yard manure plot. This may be explained in either of the two ways:—(1) That the poorer crop of juar allowed more room to develop tur, or (2) that the bone-dust manuring may be more useful to legumes than to cereals on the farm soil. But if the straw outturn of plots I and III be compared, it will be found that the luxuriance of the juar crop did not affect the development of tur, because notwithstanding much more karbi stalks in plot III the weight of tur stalks is the same and the outturn of grain nearly so. Again, in plots VII and VIII, in spite of the karbi development being less, the tur did not develop more than that of plot I. Thus the first explanation may not hold good and the second would seem to be more probable. But surely we can't rely upon this year's results alone and must have some more experience. Moreover, at this stage, the treatment received by the different plots in previous years may be influencing the present outturns. The outturns of III and IV plots show that the effect of farm-yard manure has been well continued to this year. In both the years the outturns from these plots have been good. The application of farm-yard manure containing 40 lbs. nitrogen is distinctly more profitable. Poudrette has also done well in both the years, and the outturn of the plot manured with it has also been more than plot No. IV. Thus by these two cases it is clear that the application of more nitrogen per acre has given better results with both cotton and juar.

SERIES E. SUBJECT.—*Effect of tillage to various depths on irrigated wheat grown continuously.*

Plot I.—Area ·25 acre. Scarified every year.

,, II.— ,, ·25 ,, Ploughed once with country plough and scarified.

,, III.— ,, ·25 ,, Ploughed with Swedish plough and scarified.

Plots not manured and not irrigated in year under report. Crop-wheat (*Haura*)—Nagpur.

No. of Plot.	OUTTURN PER ACRE.									
	1900-01.		1901-02.		1902-03.		1903-04.			
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Value.	Gain in value on plot No. 1.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs.	Rs.
I	361	627	259	574	751	801	554	626	19	...
II	458	590	277	598	789	914	612	788	21	2
III	529	925	317	650	935	1 233	680	828	23	4

III.—EXPERIMENTS WITH TILLAGE.

SERIES E.—As the laying of the Telinkheri main and distributary pipes could not be completed till the end of the year, there were no means of irrigating the series. By this time the work has been almost completed and it is hoped that next season the series will be irrigated as desired. The results are what might be expected. The plot ploughed with the Swedish plough has shown the best results, while that ploughed with the country plough comes second in point of outturn and the bakhared plot is the last. All the four years' results agree in showing that the use of the Swedish plough is profitable. It is satisfactory to note that the people have begun to appreciate the value of the Swedish plough. At first it was made entirely of iron and cost Rs. 23, but now, owing to the beam and handles being made of wood, its price is reduced to Rs. 16.

SERIES F. SUBJECT.—*Effect of rotation of rabi crops with regular irrigation.*

Plot I.—Area ·17 acre. Wheat every year.

,, II.— ,, ·17 ,, Wheat and lakh alternately.

,, III.— ,, ·17 ,, Wheat and gram alternately.

,, IV.— ,, ·17 ,, Wheat and gram (mixed) every year.

Plot V.—Area ·17 acre. Wheat with subordinate rows of safflower every year.

„ VI.— „ ·17 „ Wheat and sessamum alternately.

Plots not manured and not irrigated in year under report. For cropping see column 5 below :—

No. of Plot.	OUTTURN PER ACRE.						
	1902-03.			1903-04.			
	Crop.	Grain.	Straw.	Crop.	Grain.	Straw.	Value.
		lbs.	lbs.		lbs.	lbs.	Rs.
I	Wheat ...	778	893	Wheat ...	812	894	28
II	Do. ...	899	1,112	Lakh ...	659	624	15
III	Do. ...	885	1,115	Gram ...	741	329	20
IV	Wheat ...	368	526	Wheat ...	771	1,053	29
	Gram ...	238	838	Gram ...	71	79	
V	Wheat ...	512	1,164	Wheat ...	529	906	26
	Safflower ...	804	2,314	Safflower ...	182	529	
VI	Wheat ...	679	1,057	Til ...	170	629	9

SERIES G. SUBJECT.—*Rotation coriander and linseed.*

Plot I.—Area ·30 acre. Coriander and linseed alternately.

„ II.— „ ·30 „ Linseed and coriander alternately.

Plots not manured and not irrigated in the year under report.

For cropping, see column 5 below :—

No. of plot.	OUTTURN PER ACRE.						
	1902-03.			1903-04.			
	Crop.	Seed.	Stalks.	Crop.	Seed.	Stalks.	Value.
		lbs.	lbs.		lbs.	lbs.	Rs.
I ...	Coriander ...	657	647	Linseed ...	557	767	27
II ...	Linseed ...	710	1,454	Coriander ...	503	387	13

16. This series of experiments has been started to try if linseed can be grown in rotation with coriander continuously. Linseed, if grown year after year on the same field, favours the growth of a weed called Talaf, which has the same effect upon the crop as Agia has on the sugarcane. Juar is also greatly affected by Talafs, and cultivators sometimes sow coriander along with juar, and it is said that the former checks the growth of Talaf It is thus quite probable that linseed may grow continuously in rotation with coriander without being affected by Talaf. The year's results show that linseed in plot I, which was under coriander last year, has done very well. We will have to wait for some years before we can arrive at definite results. The coriander plot, in spite of the produce being good enough, is valued very low, for the fact that it is sold very cheap in the Bazar.

SERIES H. SUBJECT.—*Dry crop rotations with wheat.*

Plot I.—Area ·20 acre. Wheat every year.

„ II.— „ ·20 „ Wheat and lakh alternately.

„ III.— „ ·20 „ Wheat and gram alternately.

„ IV.— „ ·20 „ Wheat and gram (mixed) every year.

„ V.— „ ·20 „ Wheat with subordinate rows of safflower every year.

„ VI.— „ ·20 „ Wheat and sessamum alternately.

Plots not manured in year under report. For cropping, see column 5 below:—

No. of Plot.	OUTTURN PER ACRE.						
	1902-03.			1903-04.			
	Crop.	Grain.	Straw.	Crop.	Grain.	Straw.	Value.
		lbs.	lbs.		lbs.	lbs.	Rs.
I	Wheat ...	732	1,254	Wheat ...	747	1,285	27
II	Do. ...	814	1,310	Lakh ...	617	1,104	16
III	Do. ...	810	1,209	Gram ...	841	817	24
IV	Wheat ...	306	469	Wheat ...	600	910	24
	Gram ...	366	705	Gram ...	97	121	
V	Wheat ...	336	471	Wheat ...	429	626	20
	Safflower ...	532	1,785	Safflower ...	138	359	
VI	Wheat ...	712	1,081	Til ...	110	372	6

IV.—EXPERIMENTS WITH ROTATION AND MIXTURES OF CROPS.

Series F is the duplicate of Series H. The land which has been brought under these series was previously receiving quite different treatments, and it is probable that the effects of such treatments have not yet passed away. The effects of rotating wheat with teora (*Lathyrus sativus*), gram (Cicer *arietinum*) and til (*Sessamum indicum*) will be noticed next year. There is great difference in the outturns of wheat and gram in plot No. IV of both the series. This is because last year the mixture of wheat and gram was sown in the proportion of 2 of the former to 1 of the latter. While in the year under report, seeing that the higher proportion of gram in the mixture had greatly affected the outturn of wheat, it was settled to sow the mixture in the proportion of 6 of wheat to 1 of gram. Cultivators in the wheat districts generally rotate their wheat with masur (*Ervum lens*), gram (*Cicer arietinum*) and teora (*Lathyrus sativus*), that is, cereals after legumes. These series include these rotations, excepting that of masur, which has been rejected, because the crop cannot successfully be grown on the farm. In Barra also (wheat and gram mixed) we have got a combination of plants of quite different nature, and moreover it safeguards them against a precarious season, which, if it turns out bad for wheat may still be good enough for gram and *vice versâ*.

SERIES I. SUBJECT.—*Rotation experiments with kharif crops.*

Plot I.—Area ·20 acre. Cotton-tur every year.
„ II.— „ ·20 „ Cotton-tur and juar alternately.
„ III.— „ ·20 „ Cotton-tur and sessamum alternately.
„ IV.— „ ·20 „ Cotton every year.
„ V.— „ ·20 „ Cotton-juar and sanas fibre crop alternately.
„ VI.— „ ·20 „ Cotton and juar alternately.
„ VII.— „ ·20 „ Cotton-juar and wheat alternately.
„ VIII.— „ ·20 „ Cotton-juar and gram alternately.
„ IX.— „ ·20 „ Cotton-juar, wheat and gram (mixed) alternately.

Plots not manured in year under report. For cropping, see column 5 below:—

No. of plot.	OUTTURN PER ACRE.						
	1902-03.			1903-04.			
	Crop.	Grain or lint.	Straw or seed.	Crop.	Grain or lint.	Straw or seed.	Value.
		lbs.	lbs.		lbs.	lbs.	Rs.
I	Cotton ...	343	613	Cotton ...	146	297	70
	Tur ...	385	1,330	Tur ...	790	1,640	
II	Cotton ...	208	372	Juar ...	1,185	1,846	59
	Tur ...	495	1,395				
III	Cotton ...	228	409	Til ...	167	805	9
	Tur ...	285	820				
IV	Cotton ...	275	508	Cotton ...	135	275	45
V	Cotton ...	121	208	San ...	440	600	44
	Juar ...	563	3,115				
VI	Cotton ...	213	389	Juar ...	830	2,742	67
VII	Cotton ...	67	117	Wheat ...	617	1,047	22
	Juar ...	472	2,726				
VIII	Cotton ...	77	136	Gram ...	610	485	17
	Juar ...	501	3,314				
IX	Cotton ...	102	177	Wheat ...	537	897	23
	Juar ...	524	3,105	Gram ...	115	200	

17. This series of experiments includes different kinds of rotation of kharif with kharif and rabi crops. The chief among the kharif crops are cotton, juar and tur, which are rotated with wheat, gram and cold season til. If the soil of plot I, which carries continuously a crop of cotton-tur (6 lines of cotton to 2 lines of tur) due to previous treatment be not decidedly richer than that of plot IV, which grows cotton annually, it would seem that it pays better to grow cotton-tur mixed than cotton alone. Besides, in cotton districts where the area of cotton cultivation is rapidly progressing and the area of juar, which is also the important fodder crop, is decreasing with the consequence that the karbi is sold at a very dear rate, it would be foresight on the part of cultivators if they sow tur and juar along with their cotton. Tur will supply a good nutritious fodder for their work bullocks and leave the soil after it in better manurial condition. The outturns of plots II and VI seem to show that juar after cotton-tur does better than after cotton alone; and this is quite natural because juar being a cereal requires the supply of nitrogen which it can better get in plot II than in VI. Till next year no conclusions can be drawn from the other rotatiosn.

18. The crop of san hemp grew luxuriantly from the beginning and in the end gave a good outturn. In the absence of a fibre-extracting machine, the work has to be done by manual labour, and it is indeed a very tiresome process to look at the fibre being peeled off from each stick. Wheat and gram also did very well in spite of the absence of winter rains.

V.—VARIETY OF CROPS.

19. The awned variety of bajra received originally from Poona has been grown successfully on the farm for the last four years. The important characteristics of the variety are that it produces larger heads with larger and sweeter grains, and owing to the awned character of the head the birds cannot attack the crop to such an extent as they do the local varieties. During the last three years the seed has been sent for trial to the districts where bajra is grown to a large extent, and the general report is fairly satisfactory, especially from places where it has been tried with some care. The Deputy Commissioner, Narsinghpur, kindly supplied another variety under the name of Allahabad bajra and Rao Bahadur Abirchand a third from Bikaner. Both were grown side by side for the sake of comparison, and it was observed that the variety from Allahabad is as good as the awned variety, so far as the size of the head and grain are concerned. The former, however, has the grains more closely placed upon the head though not awned. The variety has again been grown this year. The Bikaner did not at all do well ; it produced only poor heads with grains set thinly upon them.

20. Sorghums (amber and collier) have been found to be the best fodder crops. If sown as soon as the monsoon sets in they come to maturity early enough to give sufficient time to prepare seed bed for such crops as gram or teora. Cultivators in rabi tracts can produce a good deal of fine fodder, if they sow sorghum in the month of June and then grow gram or teora after it is harvested. It also forms a good stuff for preparing ensilage, and to do so it will have to be cut by the end of August.

The varieties of juar usually grown to a large extent on the farm are Ganeri and Kalki (early). The variety Saoner selected last year from amongst the different varieties, which was sown in field No. 62, surpassed the two former both in yield and quality of grain. During the current year it has been given a still more prominent area under juar on the farm. Besides these, 51 varieties received from the different districts together with 50 received from the office of the Inspector-General of Agriculture were also tried in field No. 53 and their agricultural characteristics noted. These will appear in the Bulletin on Andropogon Sorghum to be issued very soon from the office of the Director of Agriculture.

Varieties of paddy.

21. Besides the varieties mentioned in last year's report 34 more varieties were grown on the farm. These were sent through the Inspector-General of Agriculture from the different rice-growing tracts of India. They were all transplanted and grown side by side. The area that could be given for them was, however, too small to give any accurate idea of the yield and quality of the grain, and the early and late varieties could therefore only be ascertained. The majority of these varieties were, however, finer grained, and came to maturity rather late, thus requiring artificial irrigation. Two varieties from Surat and one from Thana district were sufficiently early and can be grown without irrigation. Some of these are sown on the Telinkheri Farm this year, where they are given a more extended area. The early variety is doing very successfully and has been distributed in the Madras Presidency through the Inspector-General of Agriculture; it was also sent there to a private gentleman, to be grown on his farm. The three varieties—Son, Begma and Safeda—mentioned in the last year's report have done successfully, and it is hoped that the farm will be in a position to supply their seed for distribution next year.

Cotton.

22. The different varieties of cotton were again sown on the farm side by side, and 8 more crosses were obtained from the promising ones. These with the last year's crosses will be sown again to see whether they are fixed or revert to the original type, when the fixed and promising varieties will be given a more extended trial. The American varieties suffered very severely this year from excessive rain and gave no yield. The Bengal and Bombay late varieties cannot be successfully grown in this light soil without irrigation, as the bolls, from want of moisture, do not develop properly and burst only irregularly and incompletely. The Egyptian cotton was grown again in November with gram, and it is even now doubtful whether it would pay to grow it. It flowers freely during the monsoon and the fertilisation is therefore interfered with and the bolls fall off. The pickings afterwards give only a poor return. The Sea Island cotton that was left last year after pruning made good growth in the beginning, but the plants did not flower at all till very late in January, and of the few bolls that were formed only a few burst properly. The cotton was, therefore, dug out as there was no chance of its success. It was, however, sown again during the current season along with other varieties.

The following table gives in brief the improvement or otherwise of the crosses upon the parents :—

No.	Mother.	Father.	Remarks.
	Bombay.		
1	Goghari ...	Kumpta ...	More branching and boll bearing, but as late as the parents.
2	Do. ...	Sultanpur ...	As late as Goghari.
3	Do. ...	Deshi Lahori ...	Leaves and branches less hairy than in Goghari, much earlier than Goghari.
4	Kumpta ...	Goghari ...	As late as the parents but more prolific.
5	Moto Matia ...	Red Punjab ...	Stems, leaves, and flowers have slightly been tinged red as in Red Punjab.
6	Kanbi ...	Goghari ...	As late as the parents.
7	Broach Deshi ...	Kumpta ...	Do. do.
	Punjab.		
8	Deshi Lahori ...	Bani ...	Plants more vigorous and branching than Bani, lint much superior to Deshi Lahori in silkiness, strength and length.
9	Khaki ...	Egyptian ...	The colour of the lint is much lighter than in Khaki.
10	Deshi Lahori ...	Bani ...	The plant is more hairy and like Bani.
11	Do. ...	Goghari ...	Plant more hairy and branching though not quite as much as Goghari. The characteristic gland at the back of the leaf in the centre is absent in the cross, only rudimentary.
	United Provinces.		
12	Deshi Aligarh ...	Bani ...	Leaves and bolls more like those of Bani.
	Bengal.		
13	Haldia ...	Bani ...	Vigorous growing, leaves like those of Bani, lint superior to that of Haldia, but inferior to that to Bani.
	Central Provinces.		
14	Bani ...	Kil ...	Two variations were observed: (1) smaller bolls having lint inferior to that of Bani but superior to that of Kil; (2) big bolls like those of Kil with rough lint like that of Kil.
15	Do. ...	Deshi Lahori ..	Plants more vigorous and branching than those of Bani. Lint inferior to that of Bani but seeing the vigour of plants it may be recommended.
16	Do. ...	Haldia ...	Plants more branching and the leaves more deeply indented than in Bani.
17	Do. ...	Mathia ...	The plant is more like those of hyhaccum type, but beyond this no improvement seems to have been effected.
18	Do. ...	Deshi Aligarh ...	Has the vigour of Deshi Aligarh ; the leaves are intermediate in form with a crisp at the angle between the segments. The lint is inferior to Bani.
19	Jari ...	Kil ...	Has the vigour of Kil, bears longer and bigger bolls ; the lint is superior as regards length, the colour is white.
20	Upland ...	Egyptian ...	Stem and petiole not hairy as in Upland, leaves smooth, flowers bigger than in Upland petals yellowish with faint red spot in the centre of the flower, another yellow boll more tapering. In fact, the cross has quite an intermediate form.
21	Do. ...	Khaki ...	No morphological difference in plant, the lint is decidedly khaki.

The following two statements give the opinions of the Manager, Empress Mills, Nagpur, regarding the quality of the lint of the parents and the crosses :—

Names of original varieties among which the cross was effected.

No.	Names.	Remarks.
1	Mothia	... Rough and short fibre.
2	Khaki	... Usual quality; fibre fine, but shorter than Bani.
3	Gondole	... Best of all except Egyptian; very good; much longer than Bani. Better than Upland Georgian.
4	Egyptian	... Long strong fibre; very good; usual quality.
5	Jari	... Usual quality.
6	Kil	... Rough, wooly, short fibre.
7	Deshi Lahori	Do. do.
8	Goghari	... As good as Bani.
9	Haldia	... Fine fibre, but short.
10	Motas Mathia	.. Short fibre; not so good as Jari.
11	Red Punjab	... Very short fibre; not so good as Jari.
12	Deshi Aligarh	... Short like Jari.
13	Bani	... Usual fibre; strong silky; fair long.
14	Upland Georgian	... Like Bani.

No.	Names of Crosses.		Remarks.	Result of combination.
	Mother.	Father.		
1	Bani ...	Deshi Lahori ...	Fine but short; staple like Jari...	1. Grown inferior; shorter than Bani.
2	Deshi Aligarh ...	Bani ...	Wooly; rough like Jari; short fibre.	2. Grown inferior; shorter than Bani. (Has improved though gone inferior to the father.)
3	Bani ...	Haldia ...	As good as No. 11 ...	3. Grown inferior; shorter than Bani.
4	Bani ...	Kil ...	Rough; somewhat longer than Jari.	4. Do. do.
5	Upland Georgian.	Egyptian ...	Good long fibre, but weak, much longer than Bani, but not a long as Egyptian.	5. Grown slightly inferior to Egyptian. (Remains at least as good as Upland.)
6	Jari ...	Kil ...	Wooly; strong fibre; longer than Jari, but not equal to Bani.	6. Grown superior; longer than Jari.
7	Goghari ...	Deshi Lahori ...	Better than No. 11 in length; fine, silky, strong.	7. Grown very superior; longer, finer and stronger.
8	Upland ...	Gondole ...	Long silky fibre; much better than Bani.	8. Grown inferior to Gondole.
9	Upland ...	Khaki ...	Dirty cotton; fibre very long; longer than Upland and Georgian; strong.	9. Grown superior (is superior to father, but not to mother).
10	Khaki ...	Egyptian ...	Longer than No. 11 tinged weak.	10. Grown inferior; much shorter than Egyptian (the mother has improved).
11	Haldia ...	Bani ...	As good as Hinganghat; strong fibre; fine; long, silky.	11. Grown inferior; shorter than Bani (not as bad as that of Haldia).
12	Mota Mothia ...	Red Punjab ...	Very short; shorter than Jari; strong white.	12. Grown superior; longer fibre.
13	Bani ...	Deshi Aligarh ...	Same as No. 16 ...	13. Grown inferior; shorter than Bani.
14	Deshi Lahori ...	Goghari ..	Like Bani, but shorter fibre; strong.	14. Grown inferior; shorter than Goghari.
15	Bani ...	Mothia ..	Same as No. 11 ...	15. Grown superior; longer fibre stronger.
16	Deshi Lahori ...	Bani ...	Same as No. 11; somewhat shorter.	16. Grown inferior; shorter than Bani.
17	Kil .	Bani ...	Rough; wooly fibre; somewhat longer than Jari.	17. Do. do.

Note.—The aim in crosses is to improve the mother by transmitting the characteristics of the father. The Examiner has only counted upon the latter part irrespective of the fact where the improvement was aimed at. It was considered desirable in case of some superior varieties as Bani to give them the vigour of some other variety even at the risk of some deterioration of the lint, and this seems to have been effected. It is probable that the lint of the mother parent will take the qualities of that of the father by affecting the cross between them for the first.

The result expected would generally be somewhere between the two.

Statement showing the description of the Crosses.

No.	Name.	Length of grain.	Length of straw.	Length of head.	Length of flag.	Kind of head.	Kind of grain.	Late or early.	Circumference of head.	Rust.	Compact or loose.	Remarks.
1	Bansi × Khapli ...	Very long.	36″	3″	9″	Bearded.	Hard white.	Medium.	1¾″	No. ...	Compact ..	Head like Khapli; grain more securely enclosed in glumes.
2	Bansi × Haura ...	Long.	44″	3½″	10″	Do. ...	Do. ...	Do. ...	1¾″	Do. ...	Do. ...	Head more like Bansi.
3	Bangasia × Popatia ...	Do. ...	34″	3½″	11″	Do. ...	Hard red ...	Do. ...	1¾″	Do. ...	Do. ...	Head more like Popatia; grain more like Bangasia.
4	Bangasia × Haura ...											No germination.
5	Haura × Khapli ...	Very long.	39	4″	11″	Do. ..	Hard white.	Do. ...	1¾″	Do. ...	Do. ...	Ears and grain resemble Khapli.
6	Haura × Bansi ...	Do. ...	37	3½″	9″	Do. ...	Do. ...	Do. ...	1½″	Do. ...	Do. ...	Head has had some downy appearance.
7	Khapli × Bansi ...	Do. ...	36″	3½″	11″	Do. ...	Do. ...	Do. ...	1½″	Do. ...	Do. ...	Head like Bansi; grain more easily separable and thicker.
8	Khapli × Jalalia ...	Do. ..	27″	3½″	10″	Do. ...	Do. ...	Do. ...	1½″	Do. ...	Do. ...	Head differs from Khapli in colour and length.
9	Khapli × Bangasia ...	Do. ...	30″	4½″	12″	Do. ...	Do. ...	Do. ...	1¾″	Do. ...	Do. ...	Head longer, thicker, with black awns, grain hard red and plump. Good cross.
10	Khapli × Haura ...	..	...	...	...	..	..	..	...	..	...	Failed after germination.

11	Jab-Pissi × Khapli	..	Do.	33″	4½″	7″	Do. ...	Soft white.	Do. ...	1⅛″	Do. ...	Loose.	A few heads are awned.	There is not much of the appearance of crosses.
12	Jab-Pissi × Dandkhani A	...	Do. ...	32″	5″	8″	Do. ...	Do. ...	Do. ...	1½″	Do. ...	Do. ...	Do.	
13	Jab-Pissi × Dandkhani	...	Do. ...	36″	5″	7″	Do. ...	Do. ..	Do. ...	1½	Slightly.	Do. ...	Same as Pissi.	
14	Hybrid Farm × Danakhani A	...	Do. ...	35″	4½	10″	Do. ...	Do. ...	Do. ...	1¾	Do. ...	Do. ...	Same as No. 12.	
15	Hybrid Farm × Nagpur Pissi	...	Do. ...	41″	5″	10″	Do. ...	Do. ...	Do. ...	1¾	Do. ...	Do. ...	Some heads are slightly awned; grain like hybrid.	
16	Dandkhani A × Hybrid Farm	...	Do. ...	36″	4½″	10″	Do. ...	Do. ...	Do. ...	1½	Do. ...	Do. ...	Head and grain like hybrid.	
17	Dandkhani A × Popatia	...	...	...	...	...	...	...	...	...	...	...	No germination.	
18	Jalalia × Khapli	...	Very long.	39″	4½″	12″	Do. ..	Hard red.	Late.	1½	Do. ...	Compact.	Head elongated like Khapli; grain more securely closed in glumes, is longer with hairs on the top as in Khapli.	
19	Lal Pissi × Khapli	...	Long thin.	36″	5″	12″	Do. ...	Do. ...	Early.	1½	Do. ...	Loose.	Head longer than in Pissi; grain has some colour of Khapli.	
20	Nagpur Pissi × Dandkhani A	...	Long.	37″	4½″	7″	Slightly bearded.	Hard white.	Medium.	1½	Do. ...	Fairly compact.	Some spikelets have four grains, grain smaller than either.	
21	Nagpur Pissi × Hybrid Farm	...	Do. ...	43″	6″	11″	Do. ...	Soft white.	Late.	1¾	Do. ...	Do. ...	Plants more vigorous and tillering; grain thin more like Hybrid Farm.	
22	Mundi Pissi × Dandkhani	...	Do. ...	41″	5″	7″	Bearded.	Do. ...	Medium.	1¼	Do. ...	Loose.	Heads awned as in Dandkhani; grain bigger than parents; slightly differs in colour.	
23	Ekdania × Hybrid Farm	...	Very long	34″	4″	11″	Do. ...	Hard red.	Do. ...	1½	No. ...	Fairly compact.	Vigorous and tillering; red heads; grain differs in colour from the parents.	

23. *Maize.*—The Jaunpur variety of maize did very well in the beginning; but afterwards, due to incessant rain, the whole crop was spoiled, so much so that not a single cob of value for seed purposes could be obtained. The crop was cut and utilized for ensilage. Two other varieties having very big flat seeds (Cuzco maize white, Cuzco maize red) received from England were tried. Both of them grew vigorously and produced male flowers, but not a single female flower was developed in any.

24. *Paspalum dilatatum.*—The last year's crop was allowed to remain to see if it can establish by length of time and be drought-resisting. In the rainy season it yielded cuttings of nice fodder once a fortnight, but in the dry season the cuttings were obtained at much longer intervals, and that even when helped by occasional irrigation. In the hot weather we had to water twice when it looked to be very poor. The roots do not yet seem to have gone sufficiently deep. The crop has been allowed to remain on the same piece of ground.

25. The Bilaspur tur has been successfully grown on the farm and the seed was distributed to some Agricultural Assistants and a few private gentlemen. There had been many variations in the colour of the seed, but only the grey-coloured one has been kept for propagation. The arhar received from the United Provinces was also given an extended trial in the field, and it was found that the variety ripens six weeks later than the local variety and the grain is also much smaller. Its cultivation has therefore been dropped.

26. *Big-seeded Chavli.*—Grew as successfully as it did last year. Besides, the varieties received from the Inspector-General of Agriculture and from other districts were also tried. The varieties received from the Inspector-General of Agriculture were much weeviled by sowing time and therefore only some of them germinated sparingly. None of these were superior to the Sambalpur variety.

27. *Groundnut.*—The Madras variety referred to in last year's report was more extensively cultivated during the year under report. Side by side the variety received from Poona was also grown. The former has better-filled pods and gives a better outturn. The taste of the grain is also much better than in the Poona variety.

28. *Rala.*—The two varieties of rala (red and white) were grown as successfully as last year.

29. *Ensilage.*—The system of preserving green fodder was tried in two ways :—

I. The closed silo on the Experimental Farm was filled as usual in the end of August with juar stalks obtained at the time of thinning, maize stalks, and sorghum cut in the green state. It was opened in April last and a nice stuff came out which was very much liked by the farm bullocks. The silo made on the farm is not quite airtight and therefore naturally a layer about 4" deep on the sides gets spoiled.

The open silo referred to in last year's report was not built in the year under report, because we could not get sufficient fodder, and chiefly because there is wastage of about 1' deep all round which can be suffered only when there is an abundant supply of such grasses as on drying are not liked by cattle. The malguzars who have a large supply of useless coarse grasses cannot do better to economise them than to raise a square stack by cutting them in the green condition, which will be best by about the end of August. The stack can be made to any height about 8' according to the quantity of grass available After it is finished the top should be covered with some useless straw and weighted down by big logs of wood. The silo can be opened in the summer months and then it will supply an excellent green fodder needed most at the time to keep the work cattle in condition and maintain the full flow of milk in milch cows.

II. The pit silo—two pits—10' by 8' deep—were dug at the breeding farm on the slope of a hillock and filled with coarse green grasses like Tikhadi, Andropogon (*Schœnanthus*), Kusli, &c., up to about 1' from the surface of the ground, which depth was completed with earth well rammed. The pits were opened in the month of May, and excepting a few inches at the top all the stuff was in nice condition. The breeding farm cattle liked it very much. It is worth mentioning that the Kusli grass for ensilage should be cut at that stage when the awns are just to be formed. Otherwise their presence in the ensilage makes it worthless, because they remain as hard as before and prick the tongue and mouth of cattle, which therefore do not like it so well. To try this a third pit was filled with Kusli after the full development of awns, and when opened and fed what has been said above was found to be true The pit system can only be successful in high ground and where the water will not percolate in the pits.

VI.—INVESTIGATION OF PLANT DISEASES.

30. *Smut in Juar and Wheat.*—The treatment of juar seed with a solution of copper, sulphate has been continued to be a most effective remedy against smut. The strength of the solution used on the farm is about 13 per cent. (1 lb copper sulphate dissolved in 5 quart bottles full of water). It was doubted that this solution will affect the germinating power of seeds, and surely this strength does so if the seed be kept immersed in the solution for five minutes or so. But on the farm the seed is only besmeared with the solution. The seed is put in a heap on a gunny bag or a clean bit of ground, and a man goes on pouring gradually the solution with one hand and with the other manages to mix it at once with the seed. One bottle of the solution is sufficient for at least 40 lbs. of grain. The immersion method of treating the seed with different solution was also tried in the year under report, and ½ per cent. solution was found to be equally good. The other fungicides (sodium sulphide ½ per cent. solution; potassium sulphide ½ per cent. copper sulphate ½ per cent. solution hot water) were tried on both juar and wheat, but as there was no smut on the farm during the year, their efficacy could not be tested.

31. *Disease in Tur (Cajanus indicus).*—At the instance of Dr. Butler, the Cryptogamic Botanist, tur was again sown in field Nos. 61 and 13, in which this crop always gets that particular disease which may be called Tuer Wilt. Dr. Butler wanted to make full investigation about this, but since he found the same condition in Poona, he did not visit this farm. Dr. Butler writes the following from Poona about it :—"In answer to your letter No. 249 of 1903 to the Inspector-General of Agriculture regarding treatment of diseased tur crop on your farm, of which a copy was forwarded to me for dealing with direct, I have the honour to say that the treatment tried by me at Poona has proved a failure and that therefore I do not intend to repeat it at Nagpur."

32. Dr. Leather paid a visit to this farm in the month of February, and when he saw the havoc which the disease had done to tur in those fields, he wanted to grow it in the soil of the diseased field at his own laboratory and investigate the disease. The samples of the soil were accordingly sent to him in March last.

33. *Wheat Rusts.*—During the year under report 115 varieties selected from those grown last year on the farm were sown side by side to see their rust-resisting qualities and to effect such crosses as may possibly turn out resistant and have at the same time good milling qualities. Along with these varieties 23 crosses which were produced last year were also grown. The germination of all, except the 2, was very successful. The characteristics of all the varieties together with those of the crosses were noted. It is needless to mention the characteristics of all the varieties, but those of the crosses and their parents are given in the two statements below. During the year the wheat crop was not affected with rust, but in the month of February it appeared on some of the different varieties which all were regularly irrigated. But the plants had already passed the critical stage, because by this time most of the grain had already set. The field man to the Cryptogamic Botanist had been to the farm at the time, and he took with him the specimens of all the rusted varieties with rust on them.

Statement showing the description of parents.

No.	Name.	Length of grain.	Length of straw.	Length of head.	Length of flag.	Kind of head.	Kind of grain.	Late, or early.	Circumference of head.	Rust.	Compact or loose.	Remarks.
1	Bansi ...	Long.	44″	3″	9″	Awned.	Hard white.	Early.	1½	No.	Compact.	Awns black.
2	Hawra ...	,,	36″	3″	7″	,,	,,	,,	1¼	,,	Fairly compact	
3	Bangasia ...	,,	38″	3″	12″	,,	Hard red.	,,	1½	,,	Compact.	Heads down.
4	Jalalia ...	,,	36″	3″	11″	,,	Hard white.	,,	1¼	,,	,,	Ears white.
5	Jab Pissi ...	,,	45″	3″	6″	Awnless	Soft white.	,,	1½	,,	Fairly compact	
6	Dandkhani ...	,,	36″	2½″	10″	Awned.	,,	,,	1½	,,	Compact.	
7	Hybrid Farm ...	,,	40″	3½″	9″	,,	,,	,,	1½	,,	Loose.	
8	Nagpur Pissi ...	,,	34″	3″	6½″	,,	,,	,,	1¼	,,	,,	
9	Lal Pissi ...	,,	40″	3½″	8″	,,	Soft red.	,,	1¼	,,	Fairly compact	
10	Mundi Pissi ...	,,	44″	3½″	6½″	Awnless	Soft white	,,	1½	,,	,,	
11	Ekdama ...	,,	31″	3″	10″	Awned.	Hard red.	,,	1½	,,	Compact.	
12	Khapli ...	,,	32″	3½″	6″	,,	,,	,,	1¼	,,	,,	Grain very securely closed in glumes.
13	Poptia ...	,,	31″	4″	10″	,,	,,	Medium	2	Slightly.	,,	
14	Dandkhani A ...	,,	31″	2½″	8″	,,	Soft red.	Late.	1½	,,	,,	

VII.—TRIAL OF IMPLEMENTS.

34. Under this heading I may repeat a copy of the statement from last year's report which the Director of Agriculture, Central Provinces, issued to the Secretaries of District Councils. The Director had suggested that the District Councils might do some good if they distribute as prizes to cultivators the implements recommended. The table describes some useful implements with their merits and costs :—

Serial No.	Name of Implement.	Special advantage.	Full price at Nagpur.
			Rs.
1	Swedish Plough ...	An excellent iron plough for ploughing land deeply and turning over the soil. Works well in black soil, and is not too heavy for use by ordinary plough-cattle. Specially recommended for rabi cotton and juar tracts.	16
2	Harder's Fodder-cutter and Shredder.	A most useful American machine for cutting juar stalks and other fodder into short bits, which cattle eat with great ease and with no waste, resulting in much saving of fodder: can be worked by hand-power. A man working at the machine for half a day can chop fodder for 30 head of cattle. Is also most useful for cutting up green fodder for preparation into ensilage. Strongly recommended for juar tracts.	160
3	Marvin-Smith's Fodder Chopper.	A little implement which chops up fodder stalks by hand-power. Suitable for a small cultivator in a juar tract.	14
4	Poona 3-roller Iron Sugar-mill.	The most efficient sugarcane-crushing mill, is made exactly on the same principle as the indigenous wooden mill: is simple in construction and very strong. Works more rapidly than the wooden mill and extracts the maximum amount of juice. Strongly recommended for sugarcane tracts.	160
5	Poona Evaporating Sugar-pan.	A shallow iron pan of improved shape in which the maximum amount of *gur* can be prepared from sugarcane juice. Made of good sheet-iron, strongly rivetted, which lasts a long time. Strongly recommended for sugarcane tracts.	30
6	Harder's Fanning-mill.	A good machine for winnowing all varieties of grain easily worked by hand and gives a large outturn. Separates grain from all *bhusa* and dirt. Its use allows a cultivator to winnow grain every day whether there is a breeze or not. Recommended for all districts.	120
7	Marvin-Smith's Corn Sheller.	A useful little implement for shelling maize cobs. It removes all grain from maize cobs without injuring the grain. Suitable for districts where maize is commonly grown.	10
8	Hand Sieve ...	A useful article for cleaning grain and for separating good grain required for sowing purposes. The mesh of the sieve requires to be of different sizes for different kinds of grain, so that the variety of grain for which it is most required should be stated.	2-4-0
9	Marvin-Smith's Round-about Gear, two bullock-power.	A very good round about gear to be worked by two bullocks, which will give the necessary power to work all kinds of agricultural machinery.	200
10	MacCarthy Cotton Gin.	An excellent machine for ginning cotton (separating the seed from the lint) worked by hand power. The seed is not injured, so that it can be useful for sowing. Recommended for cotton tracts.	220
11	Sickle ...	A sickle of English shape, a much better implement than the ordinary native "Hasia" or "Darati."	2
12	Tifan ...	A three-line seed-drill used in the Nagpur country. Sows three lines of seeds at the same time. Suitable for districts where this implement is at present unknown.	12
13	Mayfurth's Hand Thresher.	A hand-power threshing machine, which will thresh any sort of grain, except juar, maize and the like.	160

35. It is satisfactory to note that some of the District Councils responded to this and they indented for some implements, which are particularised in the statement showing the distribution of implements.

XIII.—DISTRIBUTION OF IMPLEMENTS AND SEED.

Name of Implements.	Number of implements supplied to		
	District and other Government Officers.	Private persons.	Demonstration and Experimental Farms.
Swedish plough...	20	4	4
Turn-wrest plough	...	4	2
Hand thresher	1	1	2
Winnowers	1	5	4
Bullock gears	1	2	3
Smalley cutters	*Nil.*	8	3
Junior feed cutters	*Nil.*	6	*Nil.*
Level cutters	1	6	*Nil.*
Corn sheller	6	*1.*	*Nil.*
Broadcast sower	7	*Nil.*	*Nil.*
Wide scraper	...	...	1
Bucket pump	...	2	...
Perfection sprayer	...	3	...
Sieves	1	7	...
Sickles	3	6	...
Sugarcane pan	1	...	...
Sugarcane apparatus	...	1	...
Bakhar	...	1	11
Argarha	...	1	3
Bullock hoes	...	2	10
Tifans	9	1	1
Nari-plough	...	...	1
Yokes	1	...	5

Besides the above and others mentioned in last year's report the following new implements were also tried during the year.

36. *Harder's two-horse power treadle machine.*—This is the most useful and interesting introduction on the farm. To work it two bullocks are put in upon an inclined bridge, which is an endless chain revolving upon two toothed drums, one at each end. The upper one of these drums transmits its motion to a big toothed wheel which, after being multiplied by means of a smaller toothed wheel, is transmitted to a fly-wheel. From this the strap can be taken to work any machine, as, for instance, thresher and fodder-cutter. In the round-about gear the bullocks have to exert and apply a constant force horizontally, while in the treadle-power they have to walk simply upon the inclined plane and thus lift a portion of their weight according to the inclination. The machine has been very useful in threshing and fodder-cutting, and specially in the rainy season when we cannot cut the fodder in open places. The cost of the machine is Rs. 600.

37. *Harder's Thresher.*—This is a very important machine on the farm. Its drum is very long and thus provides greater room for feeding, unlike other threshers where only small handfuls can be fed at a time. There is a big sieve attached to the back which gets its motion along with the drum by means of another pulley. This pulley is attached to a rod with a bend in the middle where the pole of the sieve is fastened. The sieve thus gets a forward and backward motion and carries forward the straw as it comes from the thresher by means of serrated strips attached to it. The finer husk and grain is thus separated and saves much trouble and time in winnowing the grain. The cost of the machine is Rs. 225.

38. *Mayfurth's Hand Thresher.*—This machine is exactly of the old type which was brought on the farm as far back as 1888. The only improvement in the new thresher is that of the sieve attachment, which serves the same purpose as the one in Harder's thresher. The machine can be adapted to be worked by both manual and bullock power.

39. *Diamond Hay Press (from Marvin-Smith and Company of America.)*—This is also one of the new machines that were supplied to the farm this year. It has been used with advantage and the public has very well appreciated its usefulness. It can be worked with bullock power, and gives nice compact bales of any size from 2′ cubes to 5′ × 2′ × 2′. To work the machine one pair of bullocks with 3 men or women are required. Ten hours work turns out about 100 bales. Its cost is Rs. 625.

40. *Junior Feed Cutter.*—It is a strong hand-feed cutter, which can be recommended to farmers at a moderate price. It has a single knife and can be easily worked with hand. It is a very useful machine for a tenant who has about 5 pairs of bullocks, and will repay its cost in a very short time in these years of scarce fodder.

41. *Cook's Cultivator.*—This new implement has an improvement over the older, inasmuch as it has 3 steel blades—1 in front and 2 in another two alternate tines at the rear. These stir the soil and cut any stalks of the last year's crop that are left in the fields. The implement is very successfully used in clearing the fields of the juar and tur and cotton stalks.

42. *Ransoni's Turn-wrest ploughs.*—A dozen of these were ordered by the Inspector-General of Agriculture for distribution purposes; but the farm, seeing their suitableness to our soils and cheapness, purchased all of them. Four of these have been already sold to the malguzars. The plough costs Rs. 47, while the one from Cook and Sons, Lincoln, referred to in last year's report, costed Rs. 70.

IX.—DISTRIBUTION OF SEEDS.

43. The seeds supplied to the District officers, private persons and Demonstration Farms during the year under report are given in the table below:—

Name of seeds.	Quantity supplied to		
	District and other Government officers.	Private persons.	Demonstration and Experimental Farms.
	lbs.	lbs.	lbs.
Cotton (Jari))	560	2,691	1,970
Do. (Bani)	471	...	...
Do. (Nimari)	...	3	...
Do. (Upland Georgian)	4	31	...
Do. (Egyptian)	4	47	...
Juar (Ganai)	*2,874	269	1,825
Do. (Motitura))	840	13	125
Do. (Dharwari)	301	23	60
Do. (Early)	5,880	3	...
Paddy (Chinoor)	750	125	...
Do. (Early)	2,545	85	636
Tur	...	162	200
Bajra ...	78	4	...
Rala ...	215	...	...
Sorghum ...	334	62	350
Maize ..	324	10	5
Popat ...	...	1	15
Ambari ...	...	..	50
Chaoli (Sambalpur	37	3	5
San (Hemp)	...	8	250
Groundnut	8	2	...
Til (Winter)	40	10	149
Peas (Khaparkhera)	15	...	...
Wheat (Haura)		385	1,000
Do. (Bansi)	...	5	...
Do. (Jondhala)	...	5	...
Do. (Hybrid)	255	10	500
Gram ...	...	...	150
Linseed ...	...	...	270
Castor ...	...	...	102
Safflower ...	...	...	25

*Excluding 17,940 lbs. of Ganeri juar purchased and sent to Mr. A. B. Napier, Deputy Commissioner, Raipur.

NOTE.—Quantity supplied less than one pound is omitted from the return.

IX.—CATTLE-BREEDING FARM.

44. The object of this farm is to improve the bread of Arvi cattle by careful breeding so as to produce good bulls for distribution to cultivators. The stock which is not up to the mark of breeding bulls will be castrated and utilized as agricultural bullocks. No attempt is to be made to develop the milking qualities of the breed.

45. During the year under report the right wing of the old shed had to be extended by 40 feet in order to provide sufficient accommodation for the increasing number of young stock. Since the close of the year an iron shed with corrugated iron roof was set up on an adjoining hill for the accommodation of bull calves after they are weaned and separated from the cows. This separation must be attended in breeding on systematic lines, especially when the object is to rear bulls suitable for breeding purposes. In order that the cattle of the breeding may not have the slightest chance of mixing with outside cattle, a line of barbed-wire fencing surrounding the grazing area has been set up. An intermediate line of fencing separates the grazing area for bulls from that of cows, so that no chance of undesirable bulls mixing with the cows and covering them may occur.

46. The following statement shows the number of cows, bull calves, and cow calves, as it stood on the 1st April 1903 and 1904:—

	1st April 1903.	1st April 1904.
Cows ...		38
Bull calves ..		21
Cow calves ...	9	16

During the year under report 19 bull calves were transferred from the cows to what may be called the bull-rearing farm. One of the four first separated not coming up to the standard of breeding bull was castrated in the month of December. The others separated just before the close of the year will be examined in the beginning of next winter and those with unsuitable conformation will be castrated.

47. *Feeding.*—The supply of fodder and water has been ample throughout the year. There was sufficiently good green grazing along the edge of the tank. The cows were also stall-fed in the night time with dry grass and a small ration of cotton-seed, especially those which were lean in condition. In the month of February, when the green grazing began to diminish day by day, the cows began to lose condition in spite of the fact that dry grass was given to them in sufficient quantity. They were, therefore, fed on chopped *karbi* till April, when the ensilage pits were opened and the stuff got out of them was much liked. The cows with calves at foot are the first to lose condition, and experience has shown that great care should be exercised in feeding them. The condition of the bull calves has been throughout excellent. They are fed in stalls with cotton-seed and other miscellaneous grains, as, for instance, ground wheat, juar, pulses and linseed according to convenience. They get on an average 1 lb. of cotton-seed and 2 lbs. of ground grain in the proportion of 3 of cereal to 1 of linseed; they are not given linseed when fed on pulses which are sufficiently concentrated.

48. The following figures give the cost of maintaining the farm and of necessary works done during the year under report:—

		Rs.
(1) Salaries		129
(2) Special expenditure ...	Construction of wire-fencing ...	8,963
	Construction of corrugated iron shed ...	2,280
(3) Ordinary contingencies		1,407
	Total expenditure ...	12,779

X—FODDER AND FOREST RESERVES.

49. The Telinkheri and Breeding Farms and Garden continue to draw their supply of grass from the Reserve. About two-thirds of the Reserve was utilized to form grazing land for cattle of the breeding farm and has been enclosed with wire-fencing. The receipts and expenditure of the Reserve are as follows:—

Expenditure.

	Rs.
Pay of two Chaukidars	130

Receipts.

	Rs.
(1) Value of grass supplied to garden	375
(2) Value of grass supplied to Telinkheri and Breeding farms ...	900
(3) Value of grass sold to the public	454
Total ...	1,729
Deduct cost of Establishment ...	130
Net Profit ...	1,599

XI.—SEWAGE FARM.

50. During the year under report the necessary repairs were done to the channel which brings the Ambajheri tank leakage water to the farm. The season was favourably good to the crops of the Kachis, who reaped handsome profits. The receipts and expenditure of the farm are as follows:—

	Rs.
Receipts	1,594
Expenditure	995

XII.—FINANCIAL RESULTS.

51. The expenditure and receipts of the year on the farm are shown below:—

	Expenditure.			Receipts.	Net Cost.
	Salaries.	Contingencies.	Total.		
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Budget, 1903-04 ...	5,856 0 0	4,544 0 0	10,400 0 0	3,000 0 0	7,400 0 0
Actual, 1903-04 ...	4,625 3 10	2,662 15 3	7,288 3 1	6,323 3 1	965 0 0

A detailed statement showing the various items of receipts and expenditure is printed as Annexure D.

XIV.—TELINKHERI FARM.

52. The only experiment conducted at the Telinkheri Farm was to test the different methods practised in the Provinces of cultivating rice. The following table gives the outturn of paddy sown according to the different methods:—

Method of sowing.	Area.	Outturn of paddy per acre.
	Acres.	lbs.
Sown broadcast	·30	507
Sown by seed drill	·20	180
Sown broadcast and then transplanted.	·30	1 300
Sown broadcast but ploughed under, locally termed *biyasi*.	·20	1,050

The areas and outturns of the following crops grown on the farm are given below :—

Name of crops.	Areas.	Outturn per acre.
	Acres.	lbs.
Cotton (Upland Georgian).	16·72	23*
Juar ...	6·75	115
Tur ...	6·90	329
Paddy ...	9·95	473
Linseed ...	9·70	160
Gram ...	4·55	324
Safflower ...	1·75	302
Wheat ...	11·27	354

* Lint.

53. This farm is of great help in order to grow seeds required for distribution purposes. Early paddy, Upland Georgian cotton and hybrid wheat were the crops grown to obtain seeds for distribution during the year. The seeds of the two former have been already sent to the districts, while hybrid wheat is yet to be distributed for the next rabi. Some six acres of fallow land was brought under the plough, and by next season it will be suitable for growing wheat. During the last two years the farm has experienced the changes of some four overseers. The result of these constant changes is that by the time one gains an experience of the condition of the farm, he is relieved by another who is quite a new man.

The following table compares the receipts and expenditure of the year under report with that of the last year :—

	Expenditure.			Receipts.
	Salaries.	Contingencies.	Total.	
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1902-03 ...	1,219 3 9	502 6 6	1,721 10 3	2,997 10 11
1903-04 ...	1,518 11 3	341 14 8	1,860 9 11	*2,125 4 9

* Sale of produce (Rs. 810-1-6); rent of Government land (Rs. 43-0); sale of grass (Rs. 1,114-0-3); Miscellaneous (Rs. 158-3-0).

54. In conclusion my thanks are due to the Assistant Director of Agriculture, who has carefully watched the work of the farm and guided in points where his guidance was necessary and useful.

55. I also acknowledge the services of Mr. Nandkishore, the Overseer of the Experimental Farm, and Mr. Narayan Rao of the Telinkheri Farm, both of whom have worked satisfactorily.

56. The work of the Farm Clerk has also been satisfactory, and seeing his services and their length continuously on the same pay, it would seem desirable to give him some promotion.

I have the honour to be,

Sir,

Your most obedient Servant,

BHAIYALAL DUBEY,

Superintendent, Government Experimental Farm.

Experimental Farms, Labandih (Raipur District) and Powarkhera (Hoshangabad District).

The land acquired for these farms was taken over in the month of June and May 1903, and the Superintendents began work on the 13th June and 24th May, respectively. As there was not time to bring the land into a proper state of tilth, erect bandhias and sink wells before the sowing season, no attempt to start experimental work was made during the year under report. During the course of the year the necessary improvements were made on the land and the farm buildings erected.

An area of 29 acres was put under crop in the Labandih Farm and 69·50 acres in the Powarkhera Farm.

A breeding farm has been opened at Powarkhera. Five cows were purchased in July 1903 and 21 with 6 calves were added to the stock in December 1903. Eight cows gave birth to calves. A bull has been purchased and has covered 5 cows. The cows are of the Malvi breed and were selected by the Assistant to the Director of Agriculture.

An iron shed has been built for the cows and another shed is under construction which will accommodate the bull calves when they attain the age of one year.

LIST OF ANNEXURES.

A.—Statement showing the total areas under cultivation on the Experimental Farm, Nagpur, during 1903-04.

B.—Statement showing the average rates of the cost of cultivation on the Experimental Farm, Nagpur, during 1903-04.

C.—Statement showing the rates used for valuing the produce of the Experimental Farm, Nagpur, during 1903-04.

D.—Statement showing the comparison of receipt and expenditure of 1903-04 with that of 1902-03.

E.—Programme of experiments as it stood on the 1st June 1904.

Annexure A.

Total area under cultivation on the Experimental Farm, Nagpur, during the year 1903-04.

Crops.	Area.	Total.	Grand total.
	Acres.	Acres.	Acres.
A.—EXPERIMENTAL AREA.			
(1) *Kharif*—			
Cotton alone	·20		
Juar alone	·40		
Cotton and tur	·20		
Juar and tur	2·40		
San (hemp)	·20		
		3·40	
(2) *Rabi*—			
Wheat alone	4·21		
Gram alone	·66		
Lakh alone	·46		
Coriander	·30		
Linseed	·30		
Til	·66		
Wheat and gram (mixed)	·66		
Wheat and safflower (mixed)	·46		
		7·71	11·11
B.—NON-EXPERIMENTAL AREA.			
(1) *Kharif*—			
Cotton (different varieties)	12·23		
Do. (Egyptian)	·24		
Do. (Sea Island)	·67		
Paddy	·94		
Juar	10·32		
Tur	6·08		
Sorghum	2·74		
Bajra	·90		
Mung and urad, &c.	2·75		
Groundnut	·32		
		37·19	
(2) *Rabi*—			
Wheat	4·60		
Linseed	3·61		
Til	3·09		
Safflower	1·49		
Wheat and gram (mixed)	·86		
		13·65	50·84
GRAND TOTAL ...	...	...	61·95

Annexure B.

Statement showing the average cost per acre of each operation of cultivation on the Experimental Farm, Nagpur, during the year 1903-04 *as deduced from the field cultivation book.*

[The hire of a pair of bullocks is taken as 12 annas; of a male cooly 3 annas; of a female cooly 1½ annas and of a child 1 anna].

Class of operation.	Detail.	Rate per acre.	Explanation.
		Rs. a. p.	
Cost of tillage ...	Ploughing by Swedish plough ...	1 5 9	A pair of bullocks and a man for 1·45 days.
	Hoeing by bakhar (bullock hoe) ...	0 13 3	Do. do. ·89 days.
	Weed hoeing by daura (small bullock weeding hoe).	0 10 1	Do. and 2 men for ·56 days.
	Weed hoeing by dundia (large bullock weeding hoe).	0 8 1	Do. do. ·44 days.
	Weeding by hand ...	0 10 2	10 women for ·67 days.
Cost of sowing (including cost of seed).	Cotton by argarha (country drill hoe).	0 11 1	16 lbs. of seed (Re. 0-2-7). A pair of bullocks and a man and 3 women for ·43 days.
	Tur by argarha (country drill hoe).	1 1 9	17 lbs. of seed (Re. 0-12-3). A pair of bullocks and a man and 3 women for ·28 days.
	Juar by tifan (country drill) ...	0 10 1	14 lbs. of seed (Re. 0-7-9). A pair of bullocks and 2 men for ·13 days.
	Gram by Narinagar (drill plough).	2 4 3	40 lbs. of seed (1-11-11). A pair of bullocks and 2 men for ·46 days.
	Linseed by tifan (country drill) ...	1 1 4	13 lbs. of seed (Re. 0-12-5). Two pairs of bullocks and 2 men for ·16 days.
	Wheat by Narinagar (drill plough)..	6 11 4	100 lbs. of seed (Rs. 5-4-0). One pair of bullocks and 2 men for 1·29 days.
Cost of manure (excluding loading, carting and spreading).	Saltpetre	16 10 0	240* lbs. at Rs. 5-8-8 per maund.
	Bone-dust	3 6 0	*360 lbs., cost of collecting Re. 0-8-0 per maund and of crushing (Re. 0-4-0) a maund.
	Cattle-dung	10 0 0	160* maunds at Re. 0-1-0 per maund.
	Ashes of dung	11 0 8	160 maunds dung (at Re. 0-1-0) per maund and drying and burning dung ashes (Re. 1-0-8) per acre.
	Green-manuring with sun-hemp ...	9 11 10	100 lbs. of seed (Re. 3-12-0); sowing broadcast (Re. 0-1-8); covering seed by harrow (Re. 0-7-6); and cutting and ploughing (Re. 5-6-8).
Cost of harvesting.	Picking cotton	1 3 8	2 women for 6 55 days each picking.
	Reaping juar	2 1 2	8 do. for 2·76 days.
	Do. gram	1 4 0	7 do. for 1·90 days.
	Do. linseed	1 0 8	5 do. for 2·22 days.
	Do. wheat	1 0 2	4 do. for 2·69 days.
Cost of threshing and cleaning.	Ginning cotton	4 0 0	2 men and 1 woman for 8·53 days; average produce per acre 521·5 lbs. of seed cotton.
	Threshing and cleaning juar ...	0 6 2	1 man and 1 woman for 1·37 days; average produce per acre 321 lbs. of grain and 1,592 lbs. of karbi.
	Do. do. gram ...	3 2 0	4 bullocks, 1 man, 2 women and 2 boys for 1·56 days; average produce per acre 164 lbs. of grain and 805 lbs. of chaff.
	Do. do. linseed ...	1 15 3	4 bullocks, 1 man, 2 women and 2 boys for ·07 days; average produce per acre 108 lbs. of seed and 375 lbs. of stalks.
	Do. do. wheat ...	2 12 2	4 bullocks, 1 man, 3 women and 2 boys for 1·31 days; average produce per acre 367 lbs. of grain and 400 lbs. of straw.

* During the year under report the rates of manures per acre are as follows :—
Saltpetre, 474 lbs. per acre.
Bone-dust, 3,740 lbs. per acre.
Dung 4,500 lbs. per acre.

Annexure C.

Statement showing the rates used for valuing the produce of the Experimental Farm, Nagpur, during the year 1903-04.

Name of produce		Value. Rate.	Value. Per	Remarks.
		Rs. a. p.	lbs.	
Cotton (lint)	... ...	105 0 0	Bojha of 345	
Cotton-seed	... ...	10 1 0	Khandi of 640	
Juar	Grain ..	9 0 0	Do. 390	
	Karbi ...	60 0 0	Porwlas 1,000 about 3,460	
Tur	Grain ...	10 0 0	Khandi of 421	
	Stalks ...	0 12 0	Eight bundles about 560	
	Bhusa ...	1 8 0	One cart-load about 478	
Gram	Grain ...	10 0 0	Khandi of 390	
	Chaff ...	1 8 0	One cart-load about 478	
Linseed	Seed ...	17 0 0	Khandi of 385	
	Stalks and Bhusa ...	1 8 0	One cart-load about 478	
Wheat	Grain ...	12 0 0	Khandi of 400	
	Straw ...	1 12 0	One cart-load about 478	

Annexure D.

Statement showing the comparison of Receipts and Expenditure of the Experimental Farm, Nagpur, of 1903-04 *with that of* 1902-03.

Heads.	1902-03.	1903-04.	Remarks.
	Rs. a. p.	Rs. a. p.	
RECEIPTS.			
Commercial sale of produce ...	1,729 7 0	937 3 6	
Distribution { Seeds	318 10 2	901 11 8	
Distribution { Implements	172 8 0	529 8 0	
Rent of Government land ...	767 11 7	1,244 10 11	
Sewage Farm ...	1,279 7 3	1,593 15 0	
Miscellaneous ...	1,189 1 9	1,116 2 6	
Total Receipts ...	5,456 13 9	6,323 3 1	
CHARGES.			
Establishment ...	3,876 0 10	4,625 3 10	
Travelling allowances ...	164 10 0	469 1 8	
Supplies and Services.			
Charges for seed-grain ...	3 4 0	64 6 4	
Farm buildings ...	375 12 0	0 7 0	
Purchase of cattle and implements ...	101 6 0	104 1 9	
Feed and care of cattle ...	457 6 0	254 8 9	
Variable labour ...	171 13 11	249 8 0	
Sewage Farm ...	865 9 3	995 7 10	
Other charges ...	69 9 0	478 7 5	
Contingencies.			
Postage charges ...	38 3 0	42 14 0	
Telegram charges ...	...	3 2 0	
Country stationery ...	1 3 6	0 14 6	
Total Charges ...	6,724 13 6	7,288 3 1	

Annexure E.

Programme of Experiments of the Experimental Farm, Nagpur, as it stood on the 1st June 1904.

Number of Field.	Purpose of Experiment.	Crop.			Special Treatment.			Remarks.
		1st year.	2nd year.	3rd year.	1st year.	2nd year.	3rd year.	
A—I	Continuous manure experiments with irrigated wheat.	Wheat ...	Wheat ...	Wheat ...	Saltpetre (40 lbs. nitrogen per acre).	Same as in first year.	Same as in first year.	
II		Do. ...	Do. ...	Do. ...	Bone-dust (do.)...			
III		Do. ...	Do. ...	Do. ...	Saltpetre and bone-dust (25 lbs. of nitrogen in saltpetre and 15 lbs. of nitrogen in bone-dust).			
IV		Do. ...	Do. ...	Do. ...	Cattle-dung (40 lbs. nitrogen per acre).			
V		Do. ...	Do. ...	Do. ...	Cattle-dung and bone-dust (25 lbs. nitrogen cattledung and 15 lbs. nitrogen bone-dust).			
VI		Do. ...	Do. ...	Do. ...	Ashes of cattle-dung containing 40 lbs. of nitrogen per acre.			
VII		Do. ...	Do. ...	Do. ...	Unmanured			
VIII		Do. ...	Do. ...	Do. ...	Green manured with San (seed 100 lbs. per acre).			
IX		Do, ...	Do. ...	Do. ...	Manured with kadoojira (tillage as in plot 8).			
X		Do. ...	Do. ...	Do. ...	Saltpetre (20 lbs. nitrogen per acre).			
XI		Do. ...	Do. ...	Do. ...	Do. (top dressing). ...			
XII		Do. ...	Do. ...	Do. ...	Farm-yard manure (40 lbs. nitrogen per acre).			

—I B		Do.	...	Do.	...	Do.	...	Saltpetre (40 lbs. nitrogen per acre).			
II		Do.	...	Do.	...	Do.	...	Bone-dust (do.)...			
III		Do.	...	Do.	..	Do.	...	Saltpetre and bone-dust (25 lbs. of nitrogen in saltpetre and 15 lbs. of nitrogen in bone-dust).			
IV		Do.	...	Do.	...	Do.	...	Cattle-dung (40 lbs. nitrogen per acre).			
V		Do.	...	Do.	...	Do.	..	Cattle-dung and bone-dust (25 lbs. nitrogen in cattledung and 15 lbs. nitrogen in bone-dust).			
VI	Continuous manure experiments with dry crop wheat.	Do.	...	Do.	...	Do.	...	Ashes of cattle-dung containing 40 lbs. nitrogen per acre.	Do. do. ...	Do. do. ...	
VII		Do.	...	Do.	...	Do.	...	Unmanured do. ...			
VIII		Do.	...	Do,	...	Do.	...	Green manured with san (seed 100 lbs. per acre).			
IX		Do.	...	Do.	...	Do.	...	Manured with kadoojira (tillage as in plot No. 8.)			
X		Do.	...	Do.	...	Do.	...	Sal petre (20 lbs. nitrogen per acre)			
XI		Do.	...	Do.	...	Do.	...	Do. (top dressing) ...			
XII		Do.	...	Do.	...	Do.	...	Farm-yard manure (40 lbs. nitrogen per acre).			
C—I	Effect on irrigated wheat of manure applied in June and August.	Do.	...	Do.	...	Do.	...	Cattle-dung (40 lbs. nitrogen per acre in June).	Do. do. ...	Do. do. ...	
II		Do.	...	Do.	...	Do.	...	Do. in August ...			
III	Effect on unirrigated wheat of manure applied in June and August.	Do.	...	Do.	...	Do.	...	Do. in June ...	Do. do. ...	Do. do. ...	
IV		Do.	...	Do.	...	Do.	...	Do. in August ...			
D—I	Effect on cotton and juar-tur in rotation of manure.	Cotton	...	Do.	...	Do.	...	Bone-dust (40 lbs. nitrogen per acre).			
II		Juar-tur (mixed).		Do.	...	Do.	...	Unmanured ...	.....	Do. do. ...	
III		Cotton	...	Do.	...	Do.	...	Farm-yard manure (40 lbs. nitrogen per acre).			

Programme of Experiments of the Experimental Farm, Nagpur, as it stood on the 1st June 1904.—(Concld.)

No. of Field.	Purpose of Experiment.	Crop.			Special treatment.			Remarks.
		1st year.	2nd year.	3rd year.	1st year.	2nd year.	3rd year.	
D—IV	Effect on cotton and juar-tur in rotation of manure.	Cotton ...	Juar-tur mixed ...	Cotton ...	Farm-yard manure (20 lbs. nitrogen per acre).	.....	Same as in first year.	
V		Do. ...	Do. ...	Do. ...	Poudrette (40 lbs. nitrogen per acre)			
VI		Do. ...	Do. ...	Do. ...	Saltpetre (40 lbs. nitrogen per acre).			
VII		Do. ...	Do. ...	Do ...	Do. (20 lbs. nitrogen as top dressing per acre).			
VIII		Do. ...	Do, ...	Do. ...	Bone-dust and saltpetre (15 lbs. nitrogen in bone-dust and 25 lbs. nitrogen in saltpetre per acre).			
E—I	Effect of tillage to various depths on irrigated wheat grown continuously.	Wheat ...	Wheat ...	Wheat ...	Scarified every year ...	Same as in first year.	Do. do. ...	
II		Do. ...	Do. ...	Do. ...	Ploughed with one country plough and scarified.			
III		Do. ...	Do. ...	Do. ...	Ploughed with Swedish plough and scarified.			
F—I	Effect of rotation with irrigation.	Wheat ...	Wheat ...	Wheat ...	*Nil.*	*Nil.*	*Nil.*	Plots to be manured every fourth year with light dressings of farm-yard manure containing 40 lbs. nitrogen per acre. Regular irrigation to be given.
II		Do. ...	Lakh ...	Do. ...				
III		Do. ...	Gram ...	Do. ...				
IV		Wheat and gram mixed.	Wheat and gram mixed.	Wheat and gram mixed.				
V		Wheat with subordinate rows of safflower.	Wheat with subordinate rows of safflower.	Wheat with subordinate rows of safflower.				
VI		Wheat ...	Wheat ...	Wheat ...				

G—I	Rotation of coriander and linseed.	Coriander ...	Linseed ...	Coriander ...	*Nil.*	*Nil.*	*Nil.*	Light-dressing of farm-yard manure every fourth year and to irrigate to save the crop withering during drought year.
II		Linseed ...	Coriander ...	Linseed ...				
H—I	Dry crop rotations with wheat.	Wheat ...	Wheat ...	Wheat ...	*Nil.*	*Nil.*	*Nil.*	To be manured lightly every fourth year with farm-yard manure containing 40 lbs. nitrogen. Light irrigation if absolutely necessary.
II		Do. ...	Lakh ...	Do. ...				
III		Do. ...	Gram ...	Do. ...				
IV		Wheat and gram mixed.	Wheat and gram mixed.	Wheat and gram mixed.				
V		Wheat with subordinate rows of safflower.	Wheat with subordinate rows of safflower.	Wheat with subordinate rows of safflower.				
VI		Wheat ...	Sessamum ...	Wheat ...				
I—I	Rotation experiment with kharif crops.	Cotton-tur ...	Cotton-Tur ..	Cotton-tur ..	*Nil.*	*Nil.*	*Nil.*	To be lightly manured in the year in which cotton is grown with farm-yard manure (40 lbs. nitrogen per acre). Irrigation to be given to rabi crops to save withering.
II		Do. ...	Juar ...	Do. ...				
III		Do. ...	Sessamum ...	Do. ...				
IV		Cotton ...	Cotton ...	Cotton ...				
V		Cotton-juar ...	Sans as fibre-crop...	Cotton-juar ...				
VI		Cotton ...	Juar ...	Cotton .				
VII		Cotton-juar ...	Wheat ...	Cotton-juar ...				
VIII		Do. ...	Gram ...	Do. ...				
IX		Do. ...	Wheat and gram mixed.	Do. ...				
J—I	To test the effect of manures on juar with subordinate tur continuously without rotation.	Juar-tur ...	Juar-tur ...	Juar-tur ...	Saltpetre (20 lbs. nitrogen per acre drilled).	Same as in first year.	Same as in first year.	
II		Do. ...	Do. ...	Do. ...	Unmanured ...			
III		Do. ...	Do. ...	Do. ..	Cattle-dung (20 lbs. nitrogen per acre drilled).			
IV		Do. ...	Do. ...	Do. ...	Saltpetre (20 lbs. nitrogen per acre top-dressed).			
K—I	To compare the effect of growing juar-tur mixed in the same line and juar and tur grown in different lines.	Juar-tur mixed in the same lines.	Juar-tur in the same lines. ...	Juar-tur in the same lines.	.....	..		
II		Juar-tur grown in different lines (6 lines of juar to 2 lines of tur).	Juar-tur in different lines.	Juar-tur in different lines.				

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